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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/804,158	03/13/2001	Susumu Kawada	57454-037	8619

7590 07/07/2005

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EXAMINER	
ROSASCO, STEPHEN D	

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 07/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/804,158	KAWADA ET AL.	
	Examiner	Art Unit	
	Stephen Rosasco	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-74 is/are pending in the application.

4a) Of the above claim(s) 8-14 and 63-65 is/are withdrawn from consideration.

5)☒ Claim(s) 4,18,41 and 48 is/are allowed.

6)☒ Claim(s) 1-3,5-7,15-17,19-40,42-47,49-62 and 66-74 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 13 March 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

In response to the Amendment of 6/22/05, the examiner indicates allowability of claims 4, 18, 41 and 48, withdraws the previous art rejections and includes here a new art rejection over the remaining claims.

Remarks – The applicant is claiming the use of a known method of sputtering, for use in making phase shifting masks. However, the technique is well known to make similar layers in other devices. And is a modification of the conventional sputtering technique that is well known to make the claimed mask layers. The preamble language is not given as much weight as the body of the claims and the "intended use" language in the preamble is given essentially no weight at all. The examiner has made a rejection under 35 U.S.C. 103(a) and maintains that the long throw technique is a modified sputtering technique and does not rise to the level of a different technique that one in the art would not expect to be familiar with.

The description of the claims 1-74 is:

1-7, 66-72 and 74	phase shift film
8-14	withdrawn
15-26 and 73	Blank for a phase shift mask
27-37	Process for making phase shift mask blanks
38-44	Phase Shift Mask
45-59	Process for making a phase shift mask
60	Exposure method using a phase shift mask

61-62	Semiconductor Device
63-65	withdrawn

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5-7, 15-17, 19-40, 42-47, 49-62, 66-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsui et al. (5,942,356) in view of Hu (5,725,739) or Chang et al. (6,458,255).

The claimed invention is directed to a phase shifter film used for making a phase shift mask, and also to the mask, blank, method of making both and method of using the mask: characterized in that said phase shifter film is a film formed by using a reactive long throw sputtering device.

And wherein said phase shifter film is made of a molybdenum silicide oxide nitride.

Mitsui et al. teach a method for manufacturing a phase shift mask blank comprising steps of preparing a substrate, transparent to an exposure light beam, and a target containing silicon, and metal therein, wherein a mol % ratio of metal to silicon is higher than a stoichiometrically stable composition ratio of 33 relative to 67; locating the substrate and the target within an atmosphere containing nitrogen; and

sputtering the target to deposit onto the substrate a translucent phase shift film which comprises the metal, the nitrogen and the silicon.

The teachings of Mitsui et al. differ from those of the applicant in that the applicant teaches the use of the long throw sputtering technique.

The claimed invention is directed to a phase shifter film used for making a phase shift mask, and also to the mask, blank, method of making both and method of using the mask: characterized in that said phase shifter film is a film formed by using a reactive long throw sputtering device.

And wherein said phase shifter film is made of a molybdenum silicide oxide nitride.

Hu teaches (see claims 1-18) a method for depositing a material, comprising an alloy or a composite, into a recess, having an upper and lower surface, the method comprising the steps of: sputtering from a target, comprised of the material, onto the upper surface to form a layer of deposited material.

And wherein the target is comprised of an alloy or composite material, selected from the group consisting of: refractory metal silicides, magnet alloys, alloys used in micromachining manufacturing processes, and silicide composites.

And wherein the target is comprised of titanium silicide, having a ratio of silicon to titanium between approximately 2.0:1 and 2.7:1.

And further comprising the step of annealing the titanium-rich titanium silicide to reduce native oxides and form a low resistivity contact.

And wherein the sputtering and resputtering steps comprise utilizing a noncollimated, long-throw physical vapor deposition sputtering apparatus, with a substrate-to-target distance of approximately between 100 to 1,000 millimeters.

Chang et al. teach a method of producing a sputtered Ta.sub.x N.sub.y film having a resistivity of less than 25 .mu..OMEGA.·cm, wherein x is 1 and y ranges from about 0.05 to about 0.18, said method comprising: placing a substrate on a temperature-controlled support platen in a physical vapor deposition process chamber; and controlling a temperature of said support platen during sputtering of said Ta.sub.x N.sub.y film upon said substrate, wherein said substrate temperature is about 165.degree. C. or higher during deposition of said sputtered Ta.sub.x N.sub.y film, and wherein said sputter deposition is high density plasma sputter deposition, and a surface of said Ta.sub.x N.sub.y film is ion bombarded during said deposition.

Chang et al. also teach (see esp. cols. 7, 8) :

The term "long-throw sputter deposition" refer to a sputter deposition technique which utilizes conventional, non-collimated magnetron sputtering at low pressures, where the distance between the target and the substrate is equal to or greater than the diameter of the substrate. Long-throw (gamma) sputter deposition enables control of the degree of directionality in the deposition of film layers, resulting in improved step coverage as compared with conventional magnetron sputtering.

FIG. 4 is a graph showing the resistivity of a sputter-deposited Ta.sub.x N.sub.y film (deposited using long-throw or high density plasma techniques) as a function of the substrate platen heater temperature during deposition of the film, wherein x is 1 and y ranges from about 0.05 to about 0.18.

It would have been obvious to one having ordinary skill in the art to take the teachings of Mitsui et al. and combine them with the teachings of Hu or Chang et al. in order to make the claimed invention because the advantages for using the technique of long

throw sputtering for making layers on substrates similar to those in the mask art were well known, and therefore, it one in the art would know to employ the technique when making mask layers.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. Rosasco
Primary Examiner
Art Unit 1756

S.Rosasco
07/05/05